Rapid formation of large pseudostones and acute cholangitis caused by ceftriaxone treatment for bacterial pneumonia in a patient on kidney transplantation: potential risk of ceftriaxone use in patients with decreased kidney function

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To the editor,

A 38-year-old woman with 5-year history of living-donor kidney transplantation was hospitalized for high-grade fever, cough, and fatigue. Her serum creatinine level and estimated glomerular filtration rate on admission were 1.41 mg/dL and 35 mL/min/m², respectively, and her kidney function was not deteriorated compared with those values at the time of her regular visits. She was diagnosed with pneumococcal pneumonia by combination of chest roentgenogram and urinary pneumococcal antigen testing and treated with 2 g/day of ceftriaxone. Seven days of treatment with ceftriaxone cured her pneumonia, and she was discharged on the 8th hospital day. On that night, she suddenly developed fever and right upper abdominal pain. On re-admission, her serum liver enzymes were elevated and serum creatinine level and estimated glomerular filtration rate were 1.43 mg/dL and 34 mL/min/m². Computed tomography revealed massive stones in the gallbladder and common bile duct (Fig. 1a, b). She was diagnosed with acute cholangitis and pseudolithiasis probably induced by ceftriaxone. An ultrasonography performed at 6 months before hospitalization did not detect any stones in the biliary system. She received endoscopic retrograde cholangiopancreatography, followed by insertion of metallic tubes in the common bile duct and pancreatic duct. 1 month after cessation of ceftriaxone treatment, her

stones completely disappeared and tubes were withdrawn (Fig. 1c, d).

Ceftriaxone, a third-generation cephalosporin, is widely used as a treatment option for bacterial infection in patients with chronic kidney disease (CKD) because ceftriaxone has a long half-life and provides an excellent activity against a wide range of Gram-positive and Gram-negative bacteria. However, ceftriaxone occasionally induces rapid formation of slug and/or stone in the biliary tract, followed by acute cholecystitis and cholangitis [1]. As reported previously, ceftriaxone-induced pseudolithiasis occurs very rapidly and in some cases as early as 1 week as in the present case. Previous studies showed that concentration of ceftriaxone in the biliary system is highly increased. A very recent clinical study showed that CKD is a strong risk factor for ceftriaxone-induced pseudolithiasis, although it remains unknown why CKD is associated with an increased risk [2]. Our case highlights the potential risk of developing symptomatic and asymptomatic cholangitis and cholecystitis when we use ceftriaxone as a treatment option for bacterial infection in patients with reduced kidney function including patients on kidney transplant.

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Fig. 1 Imaging on admission and at 1 month after discharge. **a** Transverse section and **b** longitudinal section of the computed tomography performed on re-hospitalization. A red arrow shows a stone in the gallbladder and a dashed red arrow shows a stone in the common bile duct. **c** Computed tomography performed at 1 month after discharge.

charge. Stones in the gallbladder and common bile duct disappeared (red arrow) and only metal tubes are left (dashed red arrows). **d** Radiograph captured at the time of endoscopic retrograde cholangiopancreatography at 1 month after discharge shows no stones in the biliary system

Compliance with ethical standards

Conflict of interest The authors declare that no conflict of interest exists.

Human and animal rights All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional review board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent A written informed consent for submitting this case report to medical journals was obtained by the patient.

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